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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/002,007	12/31/97	HUNG J	015290-238

021839 IM62/0113
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EXAMINER	
VINH, L	
ART UNIT	**PAPER NUMBER**
1765	11

DATE MAILED: 01/13/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.	Applicant(s)
09/002,007	Jeffrey Hung et al.
Examiner	**Group Art Unit**
Lan Vinh	1765

☒ Responsive to communication(s) filed on *Amendment filed on 11/24/99*

☒ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire *3* month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claim

☒ Claim(s) *1-22* is/are pending in the applicat

Of the above, claim(s) *14 and 15* is/are withdrawn from consideration

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) *1-13 and 16-22* is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☒ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). *4, 5, 7*

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

DETAILED ACTION

Response to Amendment

1. The claim rejection under 35 U.S.C 112 as detailed in paper no. 9 has been withdrawn in view of the amendment filed on November 24, 1999.

2. Claims 14, 15 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention, the requirement having been traversed in Paper No. 8.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-4, 6, 8, 9, 10, 11, 12, 16, 17, 19, 20 are rejected under 35 U.S.C 103(a) as being unpatentable over Hsue et al. (US 5,554,560) in view of Shan et al. (US 5,514,247).

Hsue discloses a method for forming a planar field oxide on substrate for integrated circuit comprising: patterning a silicon nitride layer using photolithographic techniques to leave portions

of the silicon nitride layer over the device areas (Col 4, lines 1-5), forming the polysilicon gate electrodes (conducting layer) and other patterned conducting layers (Col 5, lines 46-49), depositing a leveling layer of organic anti-reflective coating composed of a polymer (Col 4, lines 56-57), etching the organic ARC layer in a reactive ion etcher using a gas mixture of CHF_3, CF_4 and Argon at a operating pressure of between about 50 to 150 milliTorr and at a RF power of 300 watts (Col 5, lines 20-29).

Regarding claims 16, 19 , although Hsue does not specifically recite using polyimide as an organic ARC, it is commonly known in the art of IC lithographic patterning that polyimide is an organic polymer ARC as evidenced by Ta (US 5,308,742).

Regarding claim 10, it is known in the art of plasma etching that a reactive ion etcher includes a chamber, an antenna outside mounted on the outer surface of the insulating member, a quartz glass insulating member and RF current is supplied to the antenna to form plasma in the chamber as evidenced by Ishii (US 5,529,657).

Unlike the instant claimed invention, Hsue does not disclose the use of chlorine in the plasma etching gas mixture for etching the organic ARC layer (dielectric)

Shan teaches that flow ranges of about 5 to 25 sccm of gases such as Cl_2, HCl are added to the basic dielectric etch gas mixture to form volatile compound with the underlying metal.

Hence, one skilled in the art would have found it obvious to modify Hsue's plasma etching gas mixture by adding chlorine to the etching gas mixture as per Shan because chlorine helps to

dissociate C-F bonds in the dielectric etch process chemistry and remove polymer residue at the surface of silicon exposed upon etching through the dielectric layer.

4. Claims 5, 7, 13, 18, 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsue et al. (US 5,554,560) in view of Shan et al. (US 5,514,247) and further in view of the following:

Hsue as modified by Shan , has been described above, fails to specifically disclose the following aspects of applicant's claimed invention: the specific ranges of pressure, temperature and gas flow rates claimed by the applicant.

However, it would have been obvious to employ any of a variety of ranges of pressure, temperature, gas flow rates because these are well known variables in the art of plasma etching which are known to effect both the rate and quality of the plasma etching process. Further, the selection of particular values for these variables would simply involve routine experimentation and would not necessitate any undo experimentation which would be indicative of a showing of unexpected results.

5. Claim 22 is rejected under 35 U.S.C 103(a) as being unpatentable over Hsue (US 5,554,560) in view of Shan et al. (US 5,514,247) and further in view of Ziger (US 5,126,289).

Hsue as modified by Shan has been described above in paragraph 5. Unlike the instant claimed invention as per claims 11, 22, Hsue and Shan does not specifically disclose the steps of

forming a photoresist layer on the organic ARC and etching the ARC selectively to preserve the photoresist layer such that lateral degradation of the photoresist layer is prevented.

Ziger discloses a semiconductor lithography method using an organic ARC includes the steps of forming a photoresist layer on an organic ARC (Col 2, lines 60-61), selectively etching the ARC layer by plasma etching using fluorine-containing compound to preserve the photoresist layer (Col 3, lines 22-25 and Fig. 5).

One skilled in the art would have found it obvious to modify Hsue and Shan by adding a photoresist layer on the organic ARC layer as per Ziger to define the desired conductor pattern which are used to permit selective etching of the exposed portion of the ARC layer.

One skilled in the art would also have found it obvious to modify Hsue and Shan by selectively etching the ARC layer to preserve the photoresist layer as per Ziger because the patterned photoresist layer is not etched by the plasma and therefore constitutes a mask for defining the etched pattern in both the ARC layer and the metal layer.

Response to Arguments

6. Applicant's arguments filed on 11/24/1999 have been fully considered but they are not persuasive.

The argument that the cited references do not suggest a method for removing an organic ARC on a metallic layer using etching agents including fluorine-containing compound, chlorine and inert gas is nor persuasive because the reference of Hsue discloses a step of removing an ARC

layer by plasma etching using CF_4, CHF_3 and Ar (Col 5, lines 20-29) and the reference of Shan discloses a step of removing an ARC layer on a metallic layer by plasma etching using fluorine-containing gas , chlorine (Col 3, lines 44-47 and Col 4, lines 20-30). The examiner maintains that the cited reference suggest the claimed method as per claims 1.

The argument that there is no suggestion in either reference of providing an ARC layer on a metallic layer is not persuasive because the reference of Shan recites forming a layer of ARC on the top of the aluminum layer (Col 3, lines 44-46). The examiner maintains that Shan suggests of providing an ARC layer on a metallic layer.

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ta (US 5,308,742) , Ishii (US 5,529,657).

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is (703) 305-6302. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech, can be reached on (703) 308-3836.

BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

LV

January 11, 2000